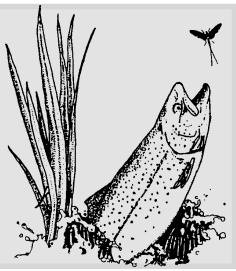
Stream Advocate



Adopt-A-Stream Program Newsletter *Spring-Summer 2002*

River Flows and Groundwater: Making the Connection

The word has long been out that Massachusetts is experiencing drought conditions. Well before summer arrived we were being told to conserve water, stop watering our lawns, use rain barrels and infiltrate as much water as possible into the ground. Some communities enforced watering restrictions as early as March. While rivers are showing a return to normal flow, one of the driest winters on record and a lack of snowmelt resulted in little groundwater infiltration through the spring months. How does it all work, and what is the big deal?

Consider this: During a 1-inch rainstorm, a 1,000 square foot roof will intercept 623 gallons of water. Multiply this times 10 houses in your immediate neighborhood and our average of about 40 inches of rain per year, and that adds up to almost 2.5 million gallons. If this water is sent onto the street, into a pipe or directly into the river or coastline, it is lost to the groundwater system. Include all the other "hard" surfaces where water directly runs off into the stormwater system, and the importance of infiltration becomes clear.

As of the beginning of June, Massachusetts was still 7 inches below normal precipitation, down from 8.5 inches a month earlier, according to the state's Drought Management Task Force. (Precipitation levels are measured from the start of the water year in October.) Low temperatures and increased rainfall in May and early June improved water levels. On June 6th the Task Force reduced the Drought Watch to a Drought Advisory, recommending continued water conservation.

Even though groundwater and stream flow levels are improving, the past year's events point to a growing problem: we are using more water than the Commonwealth's resources can maintain. Some of our rivers stop flowing even during years with relatively normal precipitation! We need to remember that we are not the only ones dependent on water levels. Especially during the height of the growing season, plants and animals that have evolved here depend on the peak water levels of the spring season and continued sustainable levels throughout the summer and into the fall.

Groundwater

Groundwater is largely hidden beneath the land surface, and so is often misunderstood. Well drilling has historically been shrouded in a certain amount of mystery, and myths about groundwater abound. (Mistaken ideas include underground rivers flowing from New Hampshire and water sitting in large underground lakes.) Actually, groundwater moves through open pore spaces between the grains of soil and rock deposits below the land surface. The amount of pore space available to store water is called *porosity*, and how well pore spaces are connected to one another (how easily water moves around between the spaces) is called *permeability*. Areas under the surface that provide both good porosity and permeability are called *aquifers*.

Between aquifers, there may be *confining layers*, layers of rock or other impermeable materials such as clay. Aquifers that are directly beneath the land surface and are unconfined at the top are called water-table aquifers. The *water table* is the level below which all the pore spaces between soil or rock particles are filled with water. Water that is not taken up by plants or animals or evaporated on the

(continued on next page)

Rain barrel to collect rainwater for reuse.

WATER CONSERVATION TIPS

From DEM Rainfall Program website-
www.state.ma.us/dem

As of the beginning of June, precipitation and ground water levels were beginning to return to normal. One of the driest winters on record gave way to early warnings of a summer drought as communities and individuals advocated conservative use of water. Even in a normal water year, water conservation will become increasingly necessary and required as we continue to consume increasing amounts of water. Here are some water conservation tips to help conserve water, no matter what the precipitation. Pass them along!

- Pay close attention to water levels across the region and use water responsibly.
- Stop or limit watering. Water no more than 1-inch a week. (1" includes measured rainfall.)
- Purchase an inexpensive rain gauge to measure rain and watering levels.
- Capture rainwater and reuse for watering.
- Plant low water plants.
- Reduce garbage disposal use by composting leftover fruits and vegetables.
- Wash only full loads of dishes and laundry.
- Fixing leaks can save gallons of water a day.
- Install low flow toilets and showerheads.

(River Flows and Groundwater-Continued from first page)

surface will seep into unpaved areas such as yards, parks, woods, etc. and enter the groundwater system. When the water table is higher than ground level, groundwater seeps through to surface features such as springs, seeps, ponds, rivers, and wetlands.

Impervious surfaces such as pavement prevent precipitation from entering the water table through the ground. The water is circumvented directly into overland flow to a river or other waterbody and discharged to the ocean much faster than its groundwater counterpart. Ironically, impervious surfaces also create higher floodwaters in addition to lower groundwater levels.

Less than 1% of all the earth's water is available to humans for direct consumption. Much of this water is stored in aquifers with often limited recharge potential. Prior to the 1970's, it was believed that overlying soil provided an effective filter or barrier to the contamination of shallow groundwater and chemicals and other waste products were routinely disposed of on land or in shallow pools. It was not until these contaminants were discovered in groundwater, that a connection was made.

The Groundwater-River Connection

Water reaches rivers and ponds through groundwater flow, direct precipitation, and surface run-off. Surface run-off is composed of water that runs off hard surfaces such as parking lots and roof-tops and does not have a chance to penetrate into the ground before it gets to the river or pond. Run-off can also reach a river through a pipe or swale as part of the town stormwater system.

Rivers and streams naturally have gaining reaches, where groundwater flows into the river contributing to stream flow, and losing reaches, where water infiltrates from the river into the ground. Cold water trout streams are usually cold because groundwater springs contribute much of the stream flow. Because much of our surface geology has been modified by glacial action, shallow groundwater in Massachusetts is often under the influence of surface water, and vice versa. During times of low precipitation, rivers rely on groundwater or *baseflow* to keep the river flowing. When groundwater wells are drilled and pumping begins, it may intercept groundwater that otherwise would have contributed to stream flow, causing the stream to lose water. Shallow bank and riffle habitats that are used by young fish, aquatic invertebrates, freshwater mussels, and other aquatic creatures disappear first as streamflows decline. Rivers can experience these "drought" conditions even during years with normal precipitation if too much water is pumped out of the watershed.

Massachusetts is already feeling the pinch from low baseflow, and efforts are ongoing to create increased infiltration in watersheds where much of the land has been converted to impervious surfaces. As citizens, we can advocate locally for reducing impervious surfaces and increasing recharge of runoff through the use of detention and retention basins, rain gardens, diverting surface flows into unpaved swales in parking lots and along roadsides, or wherever possible disconnecting direct runoff to rivers and streams. As individuals, we can collect rain in rain barrels for garden and lawn use and we can use water conservation strategies in our daily lives. Small changes in site design can have large impacts on water quality and water quantity, especially when combined with other town-wide efforts at recharge.

For more on the drought and water conservation, please see the spring issue of the Riverways Newsletter (available online). Also see Department of Environmental Management's *Rainfall Program* for up to date information on current precipitation and water conditions, press releases and suggested water conservation tips, www.state.ma.us/dem. ~

STREAM TEAM WORK AROUND MASSACHUSETTS

Across the state, many new Stream Teams have completed Shoreline Surveys and joined to begin work on behalf of their streams. Working with the town Conservation Commissions, over one-hundred volunteers surveyed the **Quinebaug River** in **Sturbridge** and **tributaries** and **Southbridge**. Students in **Douglas** worked with the Blackstone River Watershed Association on a survey of the **Mumford River**. Collaborating with the Riverways Lake Watershed Stewardship Program, the Adopt-A-Stream Program is coordinating with several local partners on a survey of the **Leesville Pond Watershed, Middle River** and **the upper Blackstone River** for a June survey. Working with the Organization for the Assabet River, eighty Stream Team volunteers in **Northboro** surveyed two tributaries in their community and the mainstem **Assabet River**. In **Hopkinton** and **Ashland** new Stream Teams are working on their Shoreline Surveys and Action Plans for Whitehall Brook and Reservoir Tributaries, Indian Brook, Cold Spring Brook, and the **Sudbury River**. Working in combination with Massachusetts Community Water Water, students in **Berkley** surveyed the **Cotley River**. Stream Team volunteers completed a shoreline survey of the **Weir River** and **Straits Pond** in **Hull**.

The **Concord River Environmental Stream Team** led boat tours of the **Concord River**, stopping at historic sites and natural areas in Billerica as part of the SuAsCo Wild & Scenic Riverfest. The **Otter River Stream Team** hosted a river paddle and a cleanup on the river. Both the **First Herring Brook Watershed Initiative** and **Friends of Alewife Reservation** reported they led nature walks as part of **Massachusetts Biodiversity Days.**

Volunteers from the Quinsigamond Village Community Center, the Blackstone River Watershed Association, Blackstone Headwaters Coalition, Leevsville Pond Association and Riverways staff work to plan for the Leesville Watershed and Middle River Survey in Worcester and Auburn.

The Riverways Programs is looking for examples of flow-stressed streams in Massachusetts for the creation of a statewide database. The following checklist should be used by citizens to document low flow conditions in local rivers and streams. Please fill out all the information to the best of your knowledge. By learning about the bottom type and stream bank cover, we can determine the potential for habitat loss at the particular location. In your comments, please indicate any specific habitat loss that you have observed.

Please return checklists to:

Margaret Kearns, Watershed Ecologist
Riverways Programs
251 Causeway Street, Suite 400
Boston, MA 02114

LOW FLOW CHECKLIST/INFORMATION FORM

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Name and contact information including email:

Watershed:____________________ Stream Name:_______________________

Town/City Name:_______________

Location (nearest road crossing or other landmark):____

1. Stream bottom: (check the most prevalent bottom type)

___Cobbles ___Gravel ___Sand ___Mud/organic matter

2. What color is the water? (circle) Cloudy Tea Milky Green/algae

3. Is there an odor? Describe _______________________

4. Does the water feel: ______Warm _______Cool _______Cold

5. Is stream flow:

___Moving slightly (some flow determined) ___Stagnant

___Ponded (areas of puddles w/dry bottom between) ___Wet or damp streambed (no water)

___Dry streambed

6. Is there evidence of:

___Dead fish ___Dead insects ___Dead mussels (If yes, please estimate numbers of each organism if possible)

___Dessication (cracking of the stream bottom sediment)

7. What is the streambank vegetative cover?

___Bordering wetlands, grasses ___Low shrubs and grasses

___Trees and shrubs ___Trees overhanging the banks

___None (impervious surface/rip-rap)

8. Has flow receded from overhanging vegetation and undercut banks?

9. Has this problem been observed before at this location? (If so list date(s) if known)

10. Please comment and include any guesses to the causes of the low flow conditions (provide evidence if you have it):

RESOURCES AND ANNOUNCEMENTS

DEM Recreational Trails Program provides funding support for a variety of trail development and trail maintenance projects. Grant applications are due July 26th. For more information see www.state.ma.us/dem or call 617/626-1453.

The Massachusetts Watershed Initiative is once again offering Volunteer Monitoring Assistance grants of up to $8,000 to support existing monitoring groups, and to develop new monitoring programs. Funds available for marine, estuary and freshwater monitoring. Responses are due July 23. For a copy of the RFR see www.comm-pass.com or contact John Clarkeson at 617/626-1175.

Community Preservation Tools. Two new features on the website provide dynamic planning tools for citizens interested in buildout analysis and planning for growth in their community. See www.state.ma.us/envir.

DEP Model Water Use Restriction Bylaw/Ordinance-www.state.ma.us/dep/brp/dws/files/wmabylaw.pdf

The **Adopt-A-Stream Program** works to support and encourage local stream teams and communities in efforts to protect and restore the ecological integrity of the Commonwealth's watersheds; rivers, streams and adjacent lands.

For more information or to receive our newsletter, please contact:

Rachel Calabro, *Coordinator*
Amy Singler, *Stream Team Organizer*

Adopt-A-Stream Program
251 Causeway Street, 4th Floor
Boston, MA 02114
(617) 626-1549
Email: Rachel.Calabro@state.ma.us

Also check out our web-site:
www.massriverways.org

Riverways Programs, Joan Kimball, Director
Department of Fisheries, Wildlife and Environmental Law Enforcement, David M. Peters, Commissioner
Executive Office of Environmental Affairs, Bob Durand, Secretary

Rivers can experience "drought" conditions even during years with normal precipitation because of our increasing water use.

Adopt-A-Stream Program
Dept. Fisheries, Wildlife & Environmental Law Enforcement
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